View metadata, citation and similar papers at core.ac.uk

brought to you by CORE

provided by University of Montana

University of Montana
ScholarWorks at University of Montana

Syllabi | Course Syllabi

Spring 2-1-2018

BIOB 595.03: ST: Landscape Genetics

Erin Landguth
University of Montana - Missoula

Let us know how access to this document benefits you.

Follow this and additional works at: https://scholarworks.umt.edu/syllabi

Recommended Citation

Landguth, Erin, "BIOB 595.03: ST: Landscape Genetics" (2018). *Syllabi*. 7519.
https://scholarworks.umt.edu/syllabi/7519

This Syllabus is brought to you for free and open access by the Course Syllabi at ScholarWorks at University of Montana. It has been accepted for inclusion in Syllabi by an authorized administrator of ScholarWorks at University of Montana. For more information, please contact scholarworks@mso.umt.edu.

BIOL 595 Landscape Genetics
Course Outline – Spring 2018

Class Location & Time Wed 9:30 – 11:30 MST
Instructor Erin Landguth
Office Location SB 377
Office Hours email me
Telephone 406-243-5221
E-mail Address erin.landguth@mso.umt.edu

Course Web Site
https://sites.google.com/site/dgs2018landscapegenetics/

Course Description

This course on Landscape Genetics provides a unique opportunity for interdisciplinary training and an overview of the field of landscape genetics. The course is designed for scientists with and interest in ecology, evolution, conservation/population genetics, landscape ecology and conservation biology. A key objective of landscape genetics is to study how landscape modification and habitat fragmentation affect organism dispersal and gene flow. Landscape genetics requires specialized interdisciplinary skills making intensive use of population genetic and spatial analysis tools. Even when students receive disciplinary training in these areas, educational programs often lack the necessary linkage and synthesis among disciplines.

Landscape Genetics will be taught in an online format linking students, faculty experts and online participants from multiple universities in North America, Europe, Asia, Africa, Australia and New Zealand. This gives students the opportunity to learn from international experts and work with peers from outside institutions.
The different universities will be linked by webcast and the course will be taught by an international team of faculty including well known experts in landscape ecology and genetics such as: Niko Balkenhol, Stéphanie Manel, Sam Cushman, Nusha Keyghobadi, Melanie Murphy, Heléne Wagner, Lisette Waits, Steve Spear, Marie-Josée Fortin, Sean Schoville, see website.

This course unites some of the most active landscape genetics groups in North America and Europe, drawing on the experience of experts both in population genetics and landscape ecology with the goal of providing an integrated overview of approaches for testing the effect of landscape and environmental variables on genetic diversity, gene flow and adaptive variation.

Each class will start with a ~50 minute live web-cast lecture by an expert on the topic followed by discussion in online breakout groups. After breaking out into the online course group discussion, a web-based plenary discussion across campuses will wrap up the weekly topic.

Class time schedule:

8:10 am Pacific: optional review of last week's lab (not Jan 17)
8:30 am Pacific: weekly lecture
9:30 am Pacific: break-out groups (including online discussion groups)
10:00 am Pacific: plenary discussion
10:30 am Pacific: end of weekly session
(Pacific Daylight Time begins 11 March, 1 hour forward)

Course Learning Objectives/Outcomes

1. Students should increase their understanding of how landscape ecology and population genetics can be integrated to address research questions in landscape genetics.
2. Students should understand how to design a landscape genetics research project.
3. Students should be able to describe a variety of analytical approaches for addressing landscape genetics research questions.

Course topics and preliminary schedule

Introduction and Overview
Week 1 (Jan. 17) Landscape Genetics: An Introduction - Spear

Theoretical Background
Week 2 (Jan. 24) Basics of Landscape Ecology - Cushman
Week 3 (Jan. 31) Basics of Population Genetics - Waits
Week 4 (Feb. 7) Basics of Metapopulation Dynamics - Keyghobadi
Week 5 (Feb. 14) Basics of Study Design - Fortin
Week 6 (Feb. 21) Basics of Adaptation and Quantitative Genetics - Csillery
Week 7 (Feb. 28) Basics of Spatial Data Analysis -Wagner

Advanced Topics
Week 8 (Mar. 7) Simulation and Modeling - Balkenhol/Landguth
Week 9 (Mar. 14) Assignment and Clustering Methods - Schoville
Week 10 (Mar. 21) Resistance Surface Modeling - Bowman
Week 11 (Mar. 28) Adaptive Landscape Genetics - Manel
Week 12 (April 4) Model Selection - Goldberg
Week 13 (April 11) Graph Theory and Network Models - Murphy

Empirical Applications
Week 14 (April 18) Plant Studies in Landscape Genetics - DiLeo
Week 15 (April 25) Aquatic Systems - Selkoe
Week 16 (May 2) Presentations of Group Projects - All (group reports due)
Week 17 (May 9) Bringing it all together and look to future - Spear

Course dates
Due to coordination across universities, this course will start Jan 17 and run until May 9, 2018, weekly on Wednesdays 9:30 – 11:30.

Required Readings
- Landscape Genetics (2015) eds Balkenhol N, Waits L, Cushman S., Wiley, London.
- Students will be expected to read 2-3 papers (e.g., reviews, case studies) in preparation for weekly seminar meetings.

Supplemental Materials
- Dyer, R (2015) Biological Data Analysis Using R, Springer (in prep or pdf version).
- R and Python, installation and tutorials offered first week of course.
- Various other population and landscape genetics software packages introduced weekly.

Receiving Credit
1 Credit
- Lecture/readings/participation (100% of grade)

2 Credits
- Lecture/readings/participation (50% of grade)
- 4 lab write-ups/assignments (50% of grade)

3 Credits (options)
Option 1:
- Lecture/readings/participation (33%)
- 15 (of 16) lab write-ups/assignments (67%)

Option 2:
- Lecture/readings/participation (33%)
- Project (67%)

4 Credits
- Lecture/readings/participation (25% of grade)
- 4 lab write-ups/assignments (25% of grade)
- Project (50%)

Lecture/readings/participation
To receive credit, you are responsible for (1) reading assigned articles and chapters, (2) participating in the group discussions, and (3) submitting lab write-ups. In our discussion group, you will have an opportunity to ask in-depth questions and discuss the lecture material with group members.

Participation: 2 parts.

(1) Read the assigned chapter(s) and/or article(s). Submit questions for each reading. Send questions via this survey: https://goo.gl/forms/LdMiPa8S5ZbYVuWW2

(2) Be present for the discussion. Ask your own questions, if others do not already ask them. Contribute to the discussion by helping others to clarify their questions and help to find answers, if possible.

For each class, you get 2 points for sending the questions and being present for the discussion (except for 1st and last classes – no readings to ask questions about). There are 32 points possible, and 26 points necessary for full credit.

Labs/Assignments

Instructors will post assignments to accompany each lecture. They will mostly be a computer lab with a write-up, but sometimes may be a conceptual exercise. The labs and assignments will need to be done independently. For those that require software, it will generally only be R, which is free and readily downloadable. Complete and email to your discussion group leader when you complete them.

Course Project

Participants will have the opportunity to sign up for group projects. The projects are not graded, but are offered as a way to get more involved in landscape genetics. Availability maybe limited due to maximum number of members in each group and priority given to institutions requiring the project as part of their class requirement. Projects are listed on the class website.

Other Information

Special Accommodations

Pleas contact Disability Services (umt.edu/dss).